Hot Projects

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The Global Pest and Disease Database: The Global Pest and Disease Database (GPDD) establishes a global 'list' of pests not known to occur in the U.S. and archives biological data. This could include taxonomy, distribution, hosts, images, biology, significance, pathways, diagnostics, and management. The GPDD assembles the relevant information for each pest into an integrated, user-friendly interface. Information can be easily navigated, as the system provides a network of links which connect to various internal/external sources. For example, within the Cooperative Agricultural Pest Survey (CAPS), mini pest risk analyses (PRA) are commonly developed for the most important CAPS pests. These mini-PRAs can be accessed through the GPDD.

NAPPFAST Predictive Modeling Tool: The NCSU/APHIS Plant Pest Forecast (NAPPFAST) System is an internet tool for plant pest modeling using georeferenced climatological weather data that has applicability throughout PPQ and beyond. Predictive maps for over 30 pests (including many pests on the CAPS target lists) have been made available at a protected site. NAPPFAST is being used to develop risk zone mapping for sudden oak death (SOD), Japanese beetle (JB), and pink hibiscus mealybug (PHM). NAPPFAST is currently in a technology transfer phase where stakeholders are being trained and applications are being rolled out to user audiences.

Mini Pest Risk Analyses for CAPS Target Pests: Through cooperative agreements with University of Minnesota and Michigan State University, CPHST has developed mini pest risk analyses (PRAs) for pests on the CAPS 2004 and 2005 target lists. These PRAs are accessible via the PPQ website and include such information as ecological suitability, host range, survey methodology, taxonomic recognition, entry potential, movement of infested material, economic impact, ecological impact, and establishment potential. PRAs are supplemented by high quality photographs, distribution maps, and other graphics. These analyses are commonly referred to by PPQ programs and others with a stake in CAPS surveys.

LUCID Keys for Pest Identification: LucID keys are digital software packages that are user friendly and advantageous beyond the traditional dichotomous key. Namely LucID keys are matrix based, allowing users to choose available character states. In addition, these keys contain interactive glossaries, fact sheets, and high quality digital images. While LucID is an independent group, CPHST has sponsored the production of keys to federal noxious weed seeds, grasshoppers, mites of quarantine significance, and aquatic weeds. The keys are commonly used by port identifiers and serve as excellent resources for stakeholders with little experience with the taxonomic group of interest.

Geospatial Information Database (GIDB): The Naval Research Laboratory's (NRL) Geospatial Information Database (GIDB) Portal System is a standards-based portal for geospatial information discovery, access, and mapping over the Internet. The GIDB Portal System presently connects the user to 128 servers including over 800 services across the U.S. The system is government-owned and requires no licensing. Currently, NRL and CPSHT are exploring GIDB's ability to gather and distribute survey information for an APHIS/ARS *Cactoblastis cactorum* (cactus moth) SIT project. Use of the GIDB Portal System will help project personnel assimilate relative spatial data and survey information rapidly and efficiently. This technology may be used operationally to enhance decision making, data analyses and reporting, and increase response efficiency.

PDA Data Collection System for Decision Support: CPHST is currently rearing and distributing phorid flies (Biocontrol) to State collaborators for releases in numerous imported fire ant (IFA) infested states and varying habitats. GIS (geographic information systems) is a dynamic tool that CPHST is using to organize and evaluate biotic and abiotic factors impacting management success into an integrated program. There are two related components to the GIS project; 1) a phorid fly tracking program, and 2) a predictive decision and management support program. The tracking component of the project is being initiated in the first two years of the multi-year project. The tracking program uses GIS technology to display and organize information on phorid fly releases within states. Spatial data are collected using PDA handheld devices. This technology is being transferred to an emerging cactus moth problem along the coastline and barrier islands in the Gulf of Mexico.

Agriculture Internet Monitoring System (AIMS): The Agricultural Internet Monitoring System (AIMS) is a tool used to identify U.S.-based internet locations selling APHIS-regulated organisms and commodities. Risk assessors are also using AIMS to find foreign sites marketing organisms and commodities, thus identifying pathways with risk potential. Using AIMS, we currently monitor sales of about 600 regulated insects, mollusks, and weeds, and we have also prepared AIMS to monitor regulated fruits, vegetables, animals, and animal products/by-products.

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Soybean Rust Coordinated Response: APHIS has developed the 'USDA Coordinated Framework for SBR Surveillance, Reporting, Prediction, and Management' in response to the first infestation of SBR in the U.S. ARS, industry, state departments of agriculture, and land grant universities contributed to the framework, which included: 1) a surveillance/monitoring network; 2) a web-based system for information management; 3) decision criteria for fungicide application; 4) prediction of SBR aerial transport; and 5) outreach for training, education, and interpretation. Aerobiological modeling was a key component in the USDA coordinated response to soybean rust and was used to demonstrate that Hurricane Ivan was a potential entry pathway.

Remote Sensing Survey of Emerald Ash Borer: The emerald ash borer beetle (EAB) has killed 6 million ash trees in urban and natural forests in southern Michigan since it was first reported. Conventional ground survey for EAB is laborious and time-consuming. Thus, surveys for new infestations using remote sensing technology – especially, hyperspectral imaging (HSI) – have been developed. HSI can distinguish individual tree species and trees exhibiting stress symptoms resulting from insect damage. CPHST scientists have used this technology to map individual ash trees and stands over survey regions and infested ashes in various stages of decline. This technology has greatly assisted the survey effort for this important pest.

Automated Insect Surveillance: Started in 2003, this project aims to develop tools which aid in the rapid screening of large samples of insects; such as those obtained from vacuum samples of row crops, as well as bark beetle and fruit fly traps. The screening tools being developed are based on direct, rather than remote, digital imaging of insect samples. The system developed has demonstrated the capability to quickly, robustly, and accurately identify to the genus level large numbers of insects from cotton vacuum samples. This automated system has demonstrated the capability to significantly decrease, from several days to several hours for large samples, the time required to count and classify field samples. This quick turn-around in providing insect densities enables growers for the first time to make biological control decisions based on real time (same day) predator/prey ratios. This in turn has huge potential economic and environmental consequences. Through biological control practices, growers can reduce costs through reduced insecticide application. Next steps include classifying a select group of samples to the species level. Robotics technology, integrated with the identification system, will physically sort the identified samples, picking-up each sample and placing it in the appropriate container.

Emerging Pest Threats & Offshore Initiative: The USDA has developed a new off-shore initiative to take preemptive action during pest invasion in the Western Hemisphere. Targeted areas include countries in the Caribbean, South American, and Pacific Islands. Components include development and evaluation of biocontrol technology prior to entry in the U.S. and development of an ultra-high speed gas chromatography for use at ports of entry. Current efforts with biocontrol of pink hibiscus mealybug and the papaya mealybug were successfully implemented in Guyana through the joint APHIS and Guyana Plant Health Unit efforts. Within 3 months, the parasitoids reduced mealybug populations by >99%. Once established in an area, the parasitoids persist even when the mealybugs are at low densities, thus keeping populations below economic injury levels. This biocontrol technology may now be transferred to any new State that becomes infested or new counties within States already infested.

Analytic Hierarchy Process: CPHST has successfully completed the second standardized CAPS priority pest list. Lists have historically been prepared using informal and inconsistent methodologies. Several multi-criteria analysis models were examined for effectiveness and operational efficacy. The analytic hierarchy process (AHP) was chosen due to ease of use, proven history, and mathematical appropriateness. The process involves defining the "pest universe", determining a list of pest-threat criteria, arranging the criteria in a logical hierarchical structure, and ranking the criteria using a pair wise comparison process. Pests were graded and prioritized according to criteria rankings. The process is currently under peer review and evaluation.

Agriculture Information Portal: The Agriculture Information Portal is being developed by CPHST to assist in data mining and information gathering. This portal aims to bring together a vast array of databases, including the Global Pest and Disease Database (GPDD), NAPPFAST, AIMS, and several others. Upon completion, users will be able to access a wide variety of biological, economic, and regulatory data from a single location.